

## **Claims**

1. A luminaire having a quasi point light source near a surface onto which light rays may impinge, comprising:

a lens system which includes

a radially collimating first lens at least partially surrounding the light source and collimating at least some of the light from the source to impinge upon a surface, and

a second optical element for receiving light rays and directing the rays to impinge upon the surface at a position closer to the lens system than the rays from the Fresnel lens

2. A luminaire as defined in claim 1 wherein said second optical element is a secondary lens and receives light rays from at least a portion of the Fresnel lens.

3. A luminaire as defined in claim 2 wherein said secondary lens radially surrounds said light source.

4. A luminaire as defined in claim 1 wherein said second optical

element is a first reflector located above the light source.

5. A luminaire as defined in claim 4, further comprising a second reflector which is cylindrical and which reflects light from the light source to said first reflector.

6. A luminaire as defined in claim 1 wherein said second optical element is a radially collimating second Fresnel lens which refracts light rays from the source to impinge upon the surface in an area closer to the lens system than the rays from the first Fresnel lens.

7. A luminaire as defined in claim 6 wherein said second Fresnel lens is a portion of and joined to said first fresnel lens.

8. A lighting assembly having a quasi point light source near a surface onto which light rays may impinge, comprising:

two canted lens ring segments at least partially surrounding the light source and collimating at least some of the light from the source to impinge upon a surface,

said lenses each having an axis which is at an angle to refract

light rays from the source toward the surface.

9. A lighting assembly as defined in claim 8 wherein said lens ring segments are aspherical.

10. A lighting assembly as defined in claim 8 wherein said lens ring segments are Fresnel elements.

11. A lighting assembly having a quasi point light source near at least one surface onto which light rays may impinge, comprising:

two radially collimating Fresnel ring lenses adjacent each other;

a quasi point light source common to said lenses and arranged in the vicinity where the lenses are closest to one another.

12. A lighting assembly as defined in claim 11 wherein said lenses are arranged at an angle with respect to one another.

13. A lighting assembly as defined in claim 12 wherein said light source has a longitudinal axis arranged approximately parallel to

transverse diameters of both lenses.

14. A lighting assembly as defined in claim 13 further comprising a reflector disposed in an open area on the opposite side of the light source from said lenses to reflect light from the light source which are not refracted by said lenses..

15. A lighting assembly as defined in claim 13 wherein said light source is mounted for movement along a common axis which bisects the angle between the lenses.

16. A lighting assembly as defined in claim 11 wherein the light source and the lenses are constructed and arranged so that the light source is disposed at the focal point of both lenses.

17. A lighting assembly as defined in claim 13 further comprising a third Fresnel lens connected between the other Fresnel lenses.

18. A lighting assembly as defined in claim 11 wherein said lenses are arranged on opposite sides of the light source.

19. A lighting assembly as defined in claim 18 wherein the lenses each have lateral center axes and the light source has a vertical axis and a lateral axis, one of the lenses being positioned so that its lateral center axis is above the lateral axis of the light source and the other of the lenses being positioned so that its lateral center axis is below the lateral axis of the light source.

20. A lighting assembly as defined in claim 18 wherein the lenses each have lateral center axes and the light source has a vertical axis and a lateral axis, one of the lenses being positioned so that its lateral center axis is aligned with the lateral axis of the light source and the other of the lenses being positioned so that its lateral center axis is below the lateral axis of the light source.

21. A lighting assembly as defined in claim 18 wherein the lenses each have lateral center axes and the light source has a vertical axis and a lateral axis, the lenses being positioned so that their lateral center axes are below the lateral axis of the light source.

22. A lighting assembly as defined in claim 21 wherein the lateral axis of one lens is closer to the lateral axis of the light source than the lateral axis of the other lens.

23. A lighting assembly as defined in claim 11 further comprising a third lens which at least partially surrounds the light source, the two Fresnel lenses also at least partially surrounding the light source.

24. A lighting assembly as defined in claim 23 wherein the lenses have nearly equal F numbers [the ratio of height to distance from the light source].

25. A lighting assembly as defined in claim 24 wherein at least one of the lenses has a different ratio of its height to the vertical dimension of the light source than the other lenses.

26. A lighting assembly, comprising:

a quasi point light source;

a radially collimating ring lens at least partially surrounding

said light source;  
a reflector on the other side of the light source from said ring lens arranged to reflect light in the same radial plane as projected by the ring lens.

27. A lighting assembly, comprising a plurality of assemblies as defined in claim 26.

28. A lighting assembly as defined in claim 27 constructed and arranged so that reflected light is projected in a radial plane parallel to the radial plane of the ring lens.

29. A lighting assembly, comprising  
a quasi point light source  
an optical system including a plurality of radially collimating ring lenses, concentric with one another and the light source, said ring lenses being offset vertically with respect to one another

30. A lighting assembly, comprising:  
a quasi point light source;

a radially collimating ring lens at least partially surrounding said light source;

a refracting ring at least partially surrounding said ring lens and having an inner surface and an outer surface, the outer surface being formed into a multiplicity of zones, at least some of said zones having multiple lenses therein, the lenses of each zone being of greater power than the lenses of adjacent zones.

31. A lighting assembly as defined in claim 30, further comprising a reflector on the other side of said source from said refracting ring for directing rays to said refracting ring.

32. A lighting fixture for being mounted on a plane to illuminate a surface on another plane perpendicular to the mounting plane, comprising:

a lighting assembly as defined in claim 28  
the lighting assembly being constructed and arranged so that a defined geometric area on the illuminated surface is evenly lighted.

33. A fixture as defined in claim 32 wherein the refracting ring has sections which have differing amounts of light diverging power so as to provide uniform lighting on the ground plane.

34. A lighting assembly, comprising:

a quasi point light source;  
a reflector assembly, having three reflector sections, one  
obeing parabolic and projecting a collimated beam and the other  
two sections being ellipsoidal and projecting a combined converging  
beam, the reflector assembly being constructed and arranged to  
produce a 180 degree in section columnar beam having varying  
divergence and concentric brightness.

35. A lighting assembly as defined in claim 34, further comprising  
a cone reflector positioned to receive the columnar beam and  
redirect it as a radially collimated beam.

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# Abstract

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## **Abstract of the Disclosure**

A lighting assembly or a luminaire has a quasi point light source near a surface onto which light rays are to impinge. There is a lens system which includes a radially collimating first Fresnel lens at least partially surrounding the light source and collimating at least some of the light from the source to impinge upon the surface, and a second optical element, which may also be a Fresnel lens, for receiving light rays and directing the rays to impinge upon the surface at a position closer to the lens system than the rays from the first Fresnel lens. This provides more uniform lighting on the surface since the first Fresnel lens lighting impinges upon the surface at a distance from the assembly, and the second Fresnel lens provides fill in lighting between the assembly and the lighting of the first Fresnel lens.

Also, a lighting assembly is provided which has a quasi point light source near the surface onto which light rays are to impinge to provide light on the surface. Two canted lens ring segments at least partially surround the light source and collimate at least some of the light from the source to impinge upon the surface. These lenses each have an axis which is at an angle, to refract light rays from the source toward the surface. The lens ring segments may be

aspherical or may be Fresnel lens elements.

Another form of the invention provides a lighting assembly having a quasi point light source near at least one surface onto which light rays are to impinge to provide lighting. There are two radially collimating Fresnel ring lenses adjacent each other and a quasi point light source is common to these lenses and arranged in the vicinity where the lenses are closest to one another. In this arrangement the lenses are arranged at an angle with respect to one another.